Reducing Carbon Footprint and Producing Biofuel From Waste Degradation and Conversion by Black Soldier Fly

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The burning of agricultural waste, which is abundant and difficult to dispose of due to its high lignin content is a main source of carbon emissions and the increase in carbon footprint, one of the main leading causes of global warming. We have developed a novel approach to solve such problem by utilizing Black soldier fly larvae (BSFL), a non-pathogenic insect able to consume 4 folds its body weight of organic waste. We aim to prolong metamorphosis by keeping insects at the larval stage, increasing its ability to consume more agricultural waste through supplementing its feed with local herbs, along with photoperiod applied. Additionally, we found that the group fed with rice straw contained the highest fat content and reduced the most carbon footprint. Furthermore, supplementing BSFL feed with a combination of sweet basil, rice straw, at appropriate photoperiod durations could reduce 1.5 times more carbon footprint. From the BSFL's ability to convert agricultural waste into fat, the fat was then extracted to produce biodiesel with high quality via transesterification. The remaining insect meal left after oil extraction can be further developed into a high-protein animal feed. Thus, our study demonstrates an effective, sustainable and environmentally friendly approach for disposing agricultural waste and converting it into valuable byproducts, reducing the environmental impact of carbon footprint and global warming.

Awards Won:
Third Award of $1,000
Sigma Xi, The Scientific Research Honor Society: Second Life Science Award of $800